

REMARKS

Entry of the foregoing, reexamination and further and favorable reconsideration in light of the following remarks, pursuant to and consistent with 37 C.F.R. § 1.112, are respectfully requested.

By the present amendment, claims 4-6, 13, and 24-27 have been canceled; without prejudice or disclaimer to the subject matter disclosed therein. Claim 1 has been amended to recite that a microorganism belonging to the subgenus *Mortierella* is cultured. Support for the amendment to claim 1 may be found, at the very least, at page 5, lines 33-37, of the specification as filed. Claim 1 has also been amended to recite "wherein the balance of the pellet form and the pulp form of the microorganism is controlled." Support for this amendment to claim 1 may be found, at the very least, at page 10, lines 8 to 18, of the specification as filed. Claim 1 has further been amended to recite that the productivity of the "unsaturated fatty acid" is enhanced. Support for this amendment to claim 1 may be found, at the very least, on page 4, lines 2-5, of the specification as filed. Support for the amendments to claims 2-3 and 8-9 may be found, at the very least, at page 5, lines 33-37, of the specification as filed. Claim 18 has been amended merely to clarify the claim. Claims 21 and 22 have been amended to recite that the microorganism belongs to the subgenus *Mortierella* and to recite that the culture medium contains a carbon source and a nitrogen source. Support for these amendments to claims 21 and 22 may be found, at the very least, at page 5, lines 33-37, and at page 5, lines 21-24. Support for new claims 28-38 may be found, at the very least, in originally filed claims 10-12, 14-20 and 23, respectively. No new matter has been added by the present amendment.

Rejection of Claims 1-27 Under 35 U.S.C. § 112, Second Paragraph

Claims 1-27 have been rejected under 35 U.S.C. § 112, second paragraph, for purportedly being indefinite. For at least all of the reasons set forth below, withdrawal of this rejection is believed to be in order.

The Examiner purports that claim 1 is indefinite in the recitation of "mycelial morphology." Claim 1 has been amended to instead recite "balance of the pellet form and the pulp form," thereby clarifying the claim. The Examiner also purports that it is unclear from the claim which products are enhanced. Claim 1 has been amended to clarify that the productivity of unsaturated fatty acids is enhanced. Finally, claim 1 has been amended to recite that the process is one for culturing "a microorganism belonging to the subgenus *Mortierella*." It is believed that these clarifying amendments to claim 1 overcome the rejection of claim 1.

The Examiner purports that claim 7 is confusing in the recitation of "mead acid." Mead acid is a common name for 5,8,11-eicosatrienoic acid. One of skill in the art would know what is meant by Mead acid, and therefore the claim is sufficiently definite and clear.

The Examiner also purports that claim 18 is indefinite because multiple "and/or" renders the claim ambiguous. Claim 18 has been amended to remove "and/or" from the claim.

Claims 21-27 are purportedly indefinite because culture media generally provides at least a carbon and a nitrogen source. The claims have been amended to recite that the culture media comprises a carbon and a nitrogen source.

With regards to the rejections of claims 26 and 27, these claims have been canceled without prejudice or disclaimer to the subject matter disclosed therein. Thus, this rejection is now moot.

In light of the above remarks, applicants respectfully request withdrawal of this rejection under 35 U.S.C. § 112, second paragraph.

Prior to turning to the prior art rejections set forth in the Official Action, a discussion of the claimed invention is believed to be in order. In this regard, the present invention relates to processes for culturing a microorganism belonging to the subgenus *Mortierella* and culture mediums to be used in such processes. As can be seen from the description on page 10, lines 8 to 18, of the specification as filed, when a filamentous fungus represented by the subgenus *Mortierella* is cultured especially by agitation and aeration in a fermenter, the mycelia take the pellet form and the pulp form. If an excess amount of the pulp form is formed, viscosity of the culture medium increases, and, as a result, the concentration of dissolved oxygen is decreased and oxygen supply by the agitation and aeration is severely hindered, resulting in decrease of the production of the desired product (i.e. unsaturated fatty acid). On the other hand, if an excess of the pellet form is formed, although an increase of viscosity of the culture medium is prevented and the concentration of dissolved oxygen in the culture medium is maintained at a high level, the pellet wall hinders transfer of oxygen from the culture medium to the mycelium, again resulting in the decrease of the production of the desired product.

Therefore, especially in the case of production of a desired product such as unsaturated fatty acids by culturing a filamentous fungus represented by the subgenus *Mortierella*, especially by agitation/aeration fermentation, a good balance of the pellet form and the pulp form is essential. The present inventors surprisingly found that the above-mentioned balance is obtained by controlling the concentrations of phosphate ions, potassium ions, sodium ions, magnesium ions and calcium ions. Thus, the present invention relates to a process for culturing a microorganism belonging to the subgenus *Mortierella* wherein the concentrations of phosphate ions, potassium ions, sodium ions, magnesium ions and calcium ions in the culture medium is adjusted to control the balance of the pellet form and the pulp form, and thereby the productivity of unsaturated fatty acids. The present invention further relates to a culture medium for use in such a process.

Rejection of Claims 1, 6 and 7 Under 35 U.S.C. § 102(b)

Claims 1, 6 and 7 have been rejected under 35 U.S.C. § 102(b) for purportedly being anticipated by Table E of Manoh et al (U.S. Patent No. 5,026,644). For at least all of the reasons set forth below, withdrawal of this rejection is believed to be in order.

Manoh et al disclose a process for culturing the fungus *Cummingmella elegans*. Manoh et al does not disclose or suggest culturing a microorganism belonging to the subgenus *Mortierella*. Therefore, Manoh et al does not disclose or suggest the present invention.

In light of these remarks, applicants respectfully request withdrawal of this rejection under 35 U.S.C. § 102(b).

Rejection of Claims 1 and 4-7 Under 35 U.S.C. § 102(b)

Claims 1 and 4-7 have been rejected under 35 U.S.C. § 102(b) for purportedly being anticipated by Suzuki et al. For at least all of the reasons set forth below, withdrawal of this rejection is believed to be in order.

Suzuki et al disclose a method for culturing fungus belonging to the genus *Mortierella*. However, as can be seen in Amano et al, *Mycotaxon* 44(2):257-265 (1992) (attached hereto as Exhibit A), all of the species disclosed by Suzuki et al (i.e. *Mortierella isabellina*, *Mortierella vinacea*, *Mortierella nana* and *Mortierella ramanniana*) all belong to the subgenus *Micromucor*. The genus *Mortierella* is classified into two subgenera, *Micromucor* and *Mortierella*. As can be seen in Amano et al, the subgenus *Micromucor* produce unsaturated fatty acids having up to 18 carbon atoms, but cannot produce unsaturated fatty acids having more than 18 carbon atoms. On the other hand, the subgenus *Mortierella* can produce unsaturated fatty acids having more than 18 carbon atoms. Therefore, the subgenus *Mortierella* of the present invention is completely different from the subgenus *Micromucor* of the Suzuki et al reference in their properties in culturing and productivity. Therefore, Suzuki et al does not disclose or suggest the claimed process and culture medium for culturing a microorganism belonging to the subgenus *Mortierella*.

Furthermore, Suzuki et al discloses a culture medium comprising 14.7 mM phosphate ion, 14.7 mM potassium ion, 1.71 mM sodium ion, 1.22 mM magnesium ion, and 0.07 mM calcium ion. The claimed range of calcium ion, 0.5 to 12 mM in the present invention, is completely different from the calcium concentration of 0.07 mM of the Suzuki et al reference. As can be seen in Tables 1 to 5 of the specification as filed, in the case

wherein the concentrations of the ions are adjusted to the claimed range, an amount of arachidonic acid produced is significantly increased. Furthermore, as can be seen from Table 6, in the case where the concentrations of the ions are adjusted to the claimed range, amounts of Mead acid and dihomo-gamma-linolenic acid produced are significantly increased.

In light of these remarks, applicants respectfully request withdrawal of this rejection under 35 U.S.C. § 102(b).

Rejection of Claim 1 Under 35 U.S.C. § 102(b)

Claim 1 has been rejected under 35 U.S.C. § 102(b) for purportedly being anticipated by Yamaguchi et al. For at least all of the reasons set forth below, withdrawal of this rejection is believed to be in order.

Yamaguchi et al disclose a method for culturing *Aspergillus ciavatus*. Yamaguchi et al does not disclose or suggest culturing a microorganism belonging to the subgenus *Mortierella*. Therefore, Yamaguchi et al does not disclose or suggest the present invention.

In light of these remarks, applicants respectfully request withdrawal of this rejection under 35 U.S.C. § 102(b).

Rejection of Claims 1-27 Under 35 U.S.C. § 103(a)

Claims 1-27 have been rejected under 35 U.S.C. § 103(a) for purportedly being unpatentable over Suzuki et al taken with Manoh et al and Yamaguchi et al. For at least all of the reasons set forth below, withdrawal of this rejection is believed to be in order.

As discussed in more detail above, none of the cited references disclose or suggest a process for culturing a microorganism from the genus *Mortierella*, subgenus *Mortierella*. Therefore, even if the disclosures of each of the cited references were taken together, one would not arrive at the claimed process or claimed culture medium. Furthermore, since none of the cited references disclose or suggest culturing a microorganism from the genus *Mortierella*, subgenus *Mortierella*, the claimed culture medium (wherein the concentrations of phosphate ions, potassium ions, sodium ions, magnesium ions and calcium ions are adjusted to control the balance of the pellet form and the pulp form of the mycelia of *Mortierella*) would not be obvious in view of the cited references, either alone or taken together.

In light of these remarks, applicants respectfully request withdrawal of this rejection of claims 1-27 under 35 U.S.C. § 103(a).

CONCLUSION

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited.

In the event that there are any questions relating to this application, the Examiner is invited to telephone the undersigned so that prosecution of the subject application may be expedited.

Respectfully submitted,

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